

after his second marriage. This two-fifths was not inherited by him nor given to him, and was not derived from property he had before his second marriage; and it is, therefore, community property of himself and his second wife. The widow's community interest in this two-fifths of his estate is not subject to the will of John Brown, but on his death one-half of the two-fifths in question goes to his widow. John Brown's estate, after the payment of the debts and expenses of administration, actually passes therefore, as follows: The widow receives the family allowance during probate which is a primary charge. She receives the home for her life; and if the home had been acquired from community property or community funds, she would have received it absolutely. The widow has received the household furniture and effects and the proceeds of the life insurance policy payable to the estate, which are exempt from execution. The widow, too, receives one-half of the two-fifths, which is community property, or one-fifth of the residue of the estate. The will is applied to the remaining three-fifths, and the daughter receives one-half thereof, and the widow one-half thereof.

The daughter has also had an unpleasant surprise following the death of her father, when told by the representatives of the life insurance companies that it would be necessary for her to obtain her stepmothers' waiver to any claim to the proceeds of the policies payable to the daughter, which the stepmother has refused to give. John Brown has paid a portion of the premiums (for the period during the second marriage) out of his earnings during that time, *i. e.*, community property, and the widow is therefore entitled to and receives a portion of the proceeds of these policies.

If John Brown were still living, he would certainly be greatly surprised to learn of the inroads made upon his estate by the statutes dealing with property exempt from execution, the provisions of the probate code for the protection and support of the family and the community property law; as his intention undoubtedly was to divide his property and his insurance equally between his daughter and his wife, after the payment of his debts and the costs of probate.

Physicians, by the very nature of their profession, and the close and confidential relations which they sustain to their patients, are consulted by many patients—sometimes of choice, and sometimes of necessity—concerning the preparation and execution of the will of the patient.

This little story of John Brown and his estate, necessarily a condensed and single illustration, clearly indicates that the drawing of a will should not be attempted, except with expert advice. There are, of course, many cases where such advice might not add materially to what the testator himself can do; but the law is intricate and complex, and every phase of the conditions relating to the testator's property, the situation and status of the members of his family, should be dealt with from a technical standpoint, if one is to obtain, as nearly as may be, the result desired.

## MUSCLE TRAINING IN INDUSTRIAL INJURIES\*

By T. E. P. GOCHER, M. D.  
San Francisco

DISCUSSION by Harold M. F. Behneman, M. D., San Francisco; John Homer Woolsey, M. D., San Francisco.

A MUSCLE is a part of the body that causes movement. This is caused by the contraction of the muscle. The muscle should be in good condition to give the best result. This "condition" can best be obtained by correct training and exercise. The condition of the muscle will depend upon whether the motor, sensory, and trophic nerves are intact and functioning in a normal manner, and that the muscle substance is also normal.

Each muscle has a chief function of which it alone is the principal factor. This function can be developed and brought out by training. In movements where multiple muscle action occurs, care must be taken that the treatment given will exercise and develop the desired muscle. When powerful muscles are present in the area, too frequently they are the ones that benefit from the exercise, and not the weakened muscle.

Muscles may act against each other from lack of nerve control. Therefore it is important that when a muscle is desired to be contracted the opponent has full relaxation. This ability to relax will often have to be taught to the patient. Very frequently following an injury the patient tries too hard to move an area, and as a result an excess number of muscles are contracted and the motion of the joint is restricted.

Relaxation of a muscle is an active state. Full relaxation is very important and at times difficult to obtain. A muscle which is relaxed always has "tone" of some degree and is not flabby. An elongated muscle of normal consistency is firm and not flabby. The position of best rest of a muscle and its opponent is when their individual tensions are equal.

If a muscle is healthy the reaction to stimulation is sharp and well defined. When disease is present this reaction is diminished. The position of nerves in an area may vary considerably and so the motor points will vary, and must be located for each muscle.

### DIAGNOSIS

The correct diagnosis is important if good results are to be expected in treating and training muscles. This is especially important in delayed muscle paralysis, which may occur from hemorrhage or secondary infection. The differentiation between a myositis, a neuritis, and neuralgia is often difficult. The treatment of each varies, and if given incorrectly may easily cause "unfortunate results." An incomplete rupture of muscle fibers is at times overlooked, and this may readily cause the patient much discomfort. Another diagnosis frequently overlooked is a serous tenosynovitis. In studying a series of cases, I found the following percentage of missed diagnosis:

\* From the surgical department of the San Francisco medical office of the Aetna Life Insurance Company.

Incorrect diagnosis in 57.1 per cent. The missed diagnoses were, in my opinion:

	Per Cent
Incomplete rupture of fibers.....	7.5
Deep hematoma .....	18.0
Diagnosis of correct muscle injured.....	22.5
Fascitis of insertion of muscle.....	12.5
Myositis called neuritis or neuralgia.....	10.0
Serous tenosynovitis.....	20.0
Not recognize overworked or toxic muscles	10.0

#### RESULTS

Muscle training in itself is not often used alone, but in conjunction with other modalities excellent results can be obtained. Table 1 shows some of the results which can be obtained.

#### MUSCLE INJURIES

A muscle that has been traumatized should not be allowed to remain at rest for a long time or a fibrosis may develop. This condition may prolong the disability and cause pain and soreness, and may at times cause a "shortening" of the muscle. A muscle that has been "forced" may at times rupture, either partial or complete, and very frequently in these conditions a fibrosis develops at the area. Should this occur it will often limit the power and the contractile ability of the muscle. Therefore the sooner that movements are instituted in a muscle injury the less chance is there of a fibrosis developing.

A "pulled" muscle may be traumatized either at the tendon insertion or in the muscle fibers. The tendon insertion is the most common location for this injury. When this occurs, very frequently a very painful localized area develops. This may be very stubborn to cure unless treated correctly.

When a contusion of a muscle occurs, very often a hematoma develops; and this may organize and a very troublesome fibrosis develop, unless early treatment is instituted. Lacerations of varying degrees and strains may also occur. These conditions usually react well to appropriate treatment.

#### TREATMENT OF MUSCLE INJURIES

Treatment of muscle injuries is a study of importance. Unless this is done the disability period may be greatly prolonged and even a marked permanent disability result. In a series of cases I have found that if a muscle is kept at rest for two weeks or over, the average injured person loses control of that muscle. The muscle will then have to be trained to act in a correct and normal manner.

**Heat.**—Heat is frequently used in treating muscle injuries. One of the best sources for heat is from bakes. I have found that a good average time for this treatment is from fifteen to twenty minutes. Frequently heat is overused, and symptoms develop which may prolong the time of the disability. Heat causes a dilatation of the blood vessel of the area and improves the circulation. The radiant light tends to increase—the infra-red to decrease—congestion that is deep. Heat should be applied to a muscle before giving training exercises.

**Massage.**—I find that overtreatment with massage is frequent. The first treatment to an injured

TABLE 1.—Showing Results After Muscle Training

Area	Cases	No. of Treatments to Cure	Days Treated
Strain quadratus lumborum	23	4	4
Strain lumbar muscle.....	9	2	5
Strain multifidus muscle.....	17	6	10
Strain rhomboid muscles.....	22	8	12
Strain latissimus dorsi.....	10	2	2
Incomplete fiber rupture.....	26	8	10
Facial paresis, unilateral.....	6	9	16
Improve grip 50 per cent.....	20	8	14

area should be of a mild and gentle nature. Simple stroking is all that is frequently required. I have seen a heavy massage given to an injured area cause a patient to be laid up in bed for several days. Many times the aching, cramps, and tired feeling which overtreatment causes retard the healing of an injury longer than if no massage had been given.

**Electricity.**—Electricity correctly given is of great value. The "opening up" of the blood vessels and the electrical changes caused by the high frequency currents tone up the muscle and benefit it. The circulatory improvement is of value, as it brings nutrition to the injured area. The sinusoidal and faradic currents may be used to cause contractions and exercise muscles. They may be a benefit or a detriment to the muscles, depending on the treatment given. Muscles are easily over-exercised and overtired if they are weak.

In using electrical stimulation the contractions at first should be very slight and even "only felt" at times. I prefer the faradic current, as developed from the Bristow coil, for individual muscle work. The sinusoidal current is best for "muscle group" work. The faradic current is very good for relieving "tired" muscles, if a fibrosis develops, and for the last stages of muscle training. The sinusoidal current is best for the early stages of muscle training, for treating myositis, and to improve the circulation.

**Exercise.**—Exercise should be given to all muscle injuries. At first they should be mild and care taken that the weakened muscle is not overtired. It is easy to overexercise a weakened muscle. The exercises should be given in the following order: assistive, passive, active and, lastly, resistive. Certain phases may at times be passed over very quickly. In giving resistive exercises, only sufficient resistance should be exercised to cause a good firm muscle contraction. Do not overtire the muscle. A good relaxation should be obtained after each contraction.

The signs of an overworked muscle are: lowered tonicity, lessened irritability, spasm not easily caused and readily "give out." Exercise makes the muscles worse, and rest relieves them. There may be a diffuse aching and throbbing at times.

The signs of a toxic or rheumatic muscle are: increased tonicity, increased irritability; and spasm and cramps are easily caused. Exercise improves, and rest makes them worse. The muscle has a

ready ability to contract. There may be a general aching present, which usually disappears following exercise.

#### MUSCLE TRAINING

When training a muscle or group of muscles to obtain good control and strength, that area should be placed at rest in such position that no strain is placed upon the muscles. The muscle to be trained should be in a position of physical rest so that gravity will assist it in any motion requiring contraction. The patient should relax both mentally and physically.

The principal action of the muscle or set of muscles to be trained should be ascertained so that exercises can be designed to give the best results. An illustration of this is that the biceps brachii muscle's principal action is supination of the forearm, and flexion of the elbow is a secondary motion. The supraspinatus muscle holds the head of the humerus in the glenoid cavity, while the deltoid abducts the arm to a right angle. Other important muscle actions are those of the tibialis anticus, which is the chief muscle in holding up the anteroposterior arch of the foot; and the peroneus longus muscle, which is the chief agency holding up the anterolateral arch of the foot.

Muscles may be trained individually or in groups. I believe that excellent results can be obtained in training many muscles, first as an individual and then as a group. An illustration of this is in training the fingers. The movements of the fingers are as follows: the deep flexors chiefly flex the distal joints, the superficial flexors the middle joints, and the lumbricals the proximal joints. The distal two joints of the fingers are extended, chiefly, by the interossei and the proximal joints by the extensor communis digitorum muscle. Each of these muscles can readily be trained individually and later as a whole. This form of treatment will give excellent results in the restoration of finger movements.

The ability to control the muscle should be first taught. With the area at rest the patient should be first taught to fully relax the muscle. This lesson is often very difficult and may at first take as long as ten or fifteen minutes to obtain a good relaxation. In teaching a muscle to relax be sure the position of the area is at rest and that there is no strain that may cause discomfort. If pain or soreness is present it is often very hard to get the desired relaxation. At times it may be necessary to cause a contraction of the opponent muscle before the patient can "sense" what is meant by relaxation. Sometimes I have the patient further force contracting the muscle to be relaxed and then attempt relaxation. Contracting a muscle against slight resistance often assists in getting "control." If, then, relaxation is not obtained, the faradic and sinusoidal currents may be resorted to. After relaxation has been obtained the patient should be shown the motion desired, and the same should be fully demonstrated to him. At times full relaxation is not obtained until after a number of treatments have been given. The patient's ability to relax should improve with each treatment.

The first exercise should be given with gravity assisting. The movements should be of a mild nature. First relaxation, then a contraction, but do not hold, and follow this by a good relaxation. Great care should be taken not to overexercise the area, as an overexercised muscle is very often difficult to return to its original state. It is far better to give only a short treatment than to overdo the treatment. All muscular contractions should be performed slowly and fully. Do not use sudden forced motions. If muscle spasm should develop, the area should be given a good full rest and as much relaxation obtained as possible before attempting further contraction. This condition is often obtained when a weakened muscle is treated too strongly, too frequently, and good relaxation is not allowed.

Very often a patient tries too hard to move a certain area and as a result more muscles are contracted than necessary. In order to remedy this the patient should be instructed to try to contract the desired muscles only mildly and not to use force until he has good control of them. This point is often illustrated when a patient contracts practically all of the muscles in his arm in attempting to move a finger.

When there is no active control the use of electricity can be resorted to. Whenever possible I prefer to use the faradic current that is obtained from a Bristow coil. This is because of the excellent control that can be obtained from this current and the type of contraction obtained. The motor points of individual muscles can very readily be stimulated by this current and training given. The sinusoidal and galvanic currents may also be used. The progress of a muscle with training is often very slow until voluntary control is obtained.

In using the faradic current I first place the area at rest and in such a position that there is no strain on the muscles. I then demonstrate and instruct the patient in the movements that are desired. The motor point of the muscle is found and the minimum strength of the current is ascertained that will give a good contraction of the muscle. The muscle is then passively stretched several times. The patient is instructed to try to contract the muscles very slightly; and as he does this I apply the current through the area of the motor point and obtain only a slight full contraction. I find that when using the current this way I obtain better results than if I had used all full strength and caused a full muscle contraction. As control is developed I lessen the strength of the current until it is no longer needed, and a good active contraction can be obtained. The sinusoidal and galvanic currents may be used in a similar manner.

The patient must be instructed and have demonstrated the correct manner of performing his exercises at home. If he should not fully understand these exercises and the manner of performing them, the best results will not be obtained. Be sure to encourage him, and do not lose patience with him. Be careful, especially at first, that he does not overexercise.

TABLE 2.—Physical Therapy—Treatment Faults

Treatment Considered	Northern California		Southern California		General Average
	No.	20 Patients Per Cent	No.	8 Patients Per Cent	
Too much treatment given.....	12	60	5	62	61
Treatment not sufficient.....	5	25	3	27	26
Overmassage.....	8	40	4	50	45
Poor control of bakes.....	11	55	6	75	65
Poor control of exercise.....	17	85	6	75	80
Poor muscle training.....	18	90	8	100	95
Explain what light work is.....	6	30	2	25	27½
Explain benefit of work.....	5	25	1	12	18½

## MUSCLE-TRAINING FAULTS

In studying a series of cases, I found the following muscle-training faults and causes of prolonged disability periods.

	Per Cent
Delay in starting motion to an injured muscle	80
Overtreatment of injured muscles.....	82
Not exercising the weakened muscle to best advantage.....	90
Allowing a fibrosis to develop in injured area	78
No home exercises given in scientific manner	45
Patient did not fully understand home exercises.....	76
Considering patient able to treat self out of office.....	46

There are other causes for the poor results that are at times obtained, but the above will be sufficient to give some idea as to the causes why good results are not always obtained. The above table was obtained by asking and considering every question with each patient. Table 2 also presents a summary of some treatment faults.

## CONCLUSIONS

Muscle injuries are very common, but good muscle training is an art that is possessed by only a few. Too often overtreatment is given, and as a result the disability period is prolonged. Exercise should be given mildly at first and not a 100 per cent work to the muscle. A weakened muscle may be called "paralyzed" when, if correctly exercised, it will be found to be able to actively contract. If the action of injured muscles is carefully studied out and appropriate training given, excellent results may be expected in practically every case.

A muscle may be considered "weakened" until it has a good full active contraction and a normal ability to relax well. This may take anywhere from a few days to many months to obtain. Remember, where there is contraction there is hope.

The accompanying table was made up by the author, following a personal study of twenty-eight patients receiving physical therapy in the main centers. All the points were carefully studied in each case. In each case the disability was prolonged, and an attempt was being made to ascertain the cause.

333 Pine Street.

## DISCUSSION

HAROLD M. F. BEHNEMAN, M.D. (384 Post Street, San Francisco).—The interesting facts and figures presented by Doctor Gocher bring to mind the constant economic loss not only from the original disability, but from hasty, inaccurate diagnosis and faulty therapy. No more than any branch of medicine is physical

therapy a cure-all. It must be preceded by accurate diagnosis and administered by trained minds and hands. This series, compiled by Doctor Gocher, is not from one locality but from observation of cases on the entire coast. The definite conclusions he justly reaches should be a stimulus to medical practitioners to know physical medicine as they do chemotherapy. The technician too often bears the burden of the amount and kind of therapy a patient is to receive. We do not approve of a druggist prescribing for our patient, nor do we allow it. We have still less cause for referring "injured patients to a technician for treatment." Those of us who are fortunate enough to be in large medical centers with their clinics, see more faulty treatment than we do diagnosis. It is not uncommon to see increased disability from harmful therapy. Doctor Gocher's figures are in accord, as he found an average of 57.1 per cent incorrect diagnosis to 95 per cent poor muscle training, 80 per cent poorly controlled exercise, 65 per cent poorly controlled baking, and 61 per cent overtreatment. Aside from the injustice to the patient it is a severe economic loss to the industry, a part of which all of us indirectly bear.

Muscle training and rehabilitation probably require more knowledge in the fundamentals of physiology and anatomy than any part of physical medicine. Untold damage is done by the lack of this basic knowledge. Here we have definite proof of more overtreatment than faulty diagnosis. I venture to say this is a fair index of the average. We know that  $O_2$  is necessary for life in general and the cell in particular. Able investigations have well proved the fact that we need no  $O_2$  during muscle contractions, but a recovery period is necessary for its storage. When exercise has been prolonged into an oxygen debt it must be paid after the work has ceased. That important recovery period is the time of repayment. If more work is started before the end of this period, the oxygen debt is going to mount rapidly. As a result the lactic acid which normally appears in muscle contraction accumulates, which, if kept up, leads to rigor mortis of varying degrees. When this dangerous situation is reached glycogen disappears, being replaced by lactic acid, which finally may cause cessation of movement.

This danger holds forth in every muscle or muscle group undergoing training. Too rapid or prolonged contraction without sufficient recovery period is, in my mind, the chief cause of continued disability in countless cases.

Are not facts such as these Doctor Gocher presents here irrefutable arguments for the teaching of physical medicine in our medical school curriculum, and for the registration and control of technicians?

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JOHN HOMER WOOLSEY, M.D. (490 Post Street, San Francisco).—An understanding of individual muscle training, as outlined by Doctor Gocher, cannot be appreciated without observing a demonstration of the manner in which it should be carried out and the relatively early and satisfactory result. I would emphasize three points illustrated in Doctor Gocher's paper: (1) Correct diagnosis as to the muscle or muscles concerned with the injury; (2) the knowledge of the true action of the individual muscle for the treatment aspect; and (3) the "recovery period" of the muscle

in order to avoid overtreatment, which leads to additional injury. The author's statistics demonstrate the lack of attention given to these three important points in physiotherapy by a great number of the medical fraternity.

Physiotherapy, in my opinion, demands special and constant study. It is still in the developmental period, and so its use is bringing out valuable points heretofore known to but a few. One will find the "Handbook of Physical Therapy," published by the American Medical Association, containing contributions by the leading physiotherapists of our country, a worthwhile text. This text supports strongly the points that have been made in this excellent contribution by Doctor Gocher.

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DOCTOR GOCHER (Closing).—I wish to thank Doctors Behneman and Woolsey for their discussion of my paper. I have attempted to give a stimulus to this subject of muscle training, and believe that if more attention is paid to this important study there will be less disabilities and the economic loss of the worker will be minimized. Up to the present time I believe too much attention has been given to the "mass" muscle training and the "individual" muscle has been slighted. It is my hope that in the future more attention will be given to this important study; and if this is done I feel certain that the results obtained will be gratifying.

## REFRACTION\*

IS IT A MEDICAL OR A NONMEDICAL PROBLEM?

By T. W. KELSEY, M. D.  
Sacramento

DISCUSSION by Dewey R. Powell, M. D., Stockton; M. N. Beigelman, M. D., Los Angeles; Joseph L. McCool, M. D., San Francisco.

WHEN one considers the great advance that scientific medicine has made during the present era, and the large amount of positive knowledge which has become available through laboratory research and otherwise, it is amazing that the profession still finds it necessary to defend definitely proved facts against the unscientific theories of disease which are forever being promulgated by quacks, cults, and others. If it were not, however, for the gullibility of mankind and the wonderful power of advertising, this condition might not prevail; but Barnum was right, and through advertising one can sell anything, regardless of merit, be it ideas, service or merchandise.

### LAY PRESS MISINFORMATION

At the present time the public is being fairly deluged with misinformation regarding health and disease through the magazine, the newspaper, and the radio by those who seek to promote their fantastic claims to cure the sick by means of diet, mental suggestion, physical culture, spinal adjustments, drugless methods, etc.

Because of this, together with the fact that the medical profession does not advertise, the public is unable to know who's who in the treatment of disease, the result being that anyone who has a pleasing personality and a good press agent always gets a following regardless of qualifications and

previous training for the work he is doing. Cults have thus arisen in competition with every branch of scientific medicine.

This is especially true so far as ophthalmology is concerned. The time was when everyone consulted an ophthalmologist when he had anything wrong with his eyes. Not so today. During recent years, ophthalmologists, through no fault of their own, have found themselves many times to be in direct competition with department stores and a large commercial group who designate themselves by various names, such as refracting optician, optometrist, optical specialist, doctor of optics, etc. Not being a part of the medical profession, this latter group has resorted to newspaper advertisements and other publicity methods which ethical physicians have steadfastly refused to employ. By reason of this they have not only made decided inroads into the legitimate field of ophthalmology, but they have also caused many people to believe that refraction is purely a mechanical procedure and not necessarily a medical problem.

### REFRACTION A MEDICAL PROBLEM

In this paper I shall endeavor to prove that refraction is a medical problem in all cases and should be entrusted only to the medical eye specialist.

To begin with there are many local eye diseases and many local eye manifestations of general diseases elsewhere in the body that may be responsible for the eye symptoms of which patients complain. If the one consulted has not had the background of a medical education he is in no position either to diagnose the condition or prescribe the right treatment for the patient.

Of the local eye conditions, mention must be made of all diseases of the lids, lachrymal apparatus, eye muscles, conjunctiva, and cornea externally, while internally one frequently finds some disease of the iris, lens, ciliary body, retina, choroid, optic nerve and vitreous, to be responsible for the symptoms.

Of general diseases with eye manifestation, there are so many that it would be difficult to enumerate them all. The most prominent of these, however, are syphilis, tuberculosis, nephritis, diabetes, arteriosclerosis, brain tumor, and focal infections. In fact there is no other organ in the body that is subject to so many diseases, both local and general, as is the eye.

If for no other reason than the one just mentioned, all eye conditions should be cared for only by medical specialists. Also, when one's vision begins to fail or other eye symptoms, such as headache, develop, the patient is unable to judge whether the symptoms of which he complains is the result of a refractive error or some local or general disease. This being true, the patient should at least consult someone who is familiar with both refraction and diseases of the eye, as well as diseases in general, if he would do the best thing for himself.

For the sake of argument let us assume that the symptoms of which the patient complains are

\* Read before the Eye, Ear, Nose and Throat Section of the California Medical Association, at the sixty-first annual session, Pasadena, May 2-5, 1932.